1 General introduction

The dichotomous relation between the Dutch and the sea
The landscape and inhabitants of the Netherlands have been inextricably connected to water from the past until today. The country’s name ‘Netherlands’, meaning ‘Lowlands’, refers to the vulnerable position of the land with respect to the sea. A large part of the country lies several meters below sea level and would submerge if reached by the sea. However, the Dutch consider themselves relatively safe as they rely upon an impressive coastal defense system of dikes, dams, sluices and floodgates as well as a highly developed inland water management system. About a thousand years ago defense of Dutch inhabitants against the sea made use of elevated natural phenomena like coastal dunes, tidal barriers, peat domes and boulder clay outcrops, as well as of man-made dwelling mounds (Dutch terpen and wierden).

In the Dutch coastal plain, systematic construction of longer coastal dikes started in the 11th and 12th century. In the sector of the coastal plain that is the study area of this thesis, however, they did not constitute an efficient barrier against the force of the North Sea, breaching inland and creating the Zuyder Zee (e.g. Rienks & Walther 1954; Van Buijtenen & Obreen 1956). In the High and Late Middle Ages marine erosion and flooding resulted in large-scale land loss, submerged settlements, swarms of shipwrecks and repeated loss of many lives. While it is true that the Dutch kept a clear association in mind between ‘death’ and ‘danger’ on the one hand and ‘water’ and ‘storms’ on the other hand, also because they could not afford to give up use of the coastal land as the population kept growing and reclaimed acres were needed for food production, they also developed a specific bond with the inland and outland water systems (Fig. 1.1). The delta and coastal position of the Dutch territory turned out to be ideal for maritime trade, as major European rivers like the Rhine and Meuse worked their ways through the lands towards the North Sea. Furthermore, the long North Sea coastal

Figure 1.1. A heavy storm on the Zuyder Zee near the island of Schokland. 19th century painting by Hermanus Koekkoek (Zuiderzeecollectie, Enkhuizen).
zone, Wadden Sea shores and Zuyder Zee tidal lagoon rim provided good opportunities for coastal settlements to focus on trade and fishing. Maritime trade (i.e. the Hanseatic League, the Dutch East India Company, the Dutch West India Company and the Early Modern Baltic trade) brought the Dutch great wealth and power. The love and hate for water is also tangible for the theme of this PhD study, which is the late medieval Zuyder Zee ingressions that destroyed lands and settlements in the heart of the country, but that also opened up new maritime trade routes that brought wealth and prosperity.

State of the art
The most important research discipline in this thesis is Maritime Archaeology. There has always been a strong connection between maritime archaeology as a discipline and shipwrecks as its objects of study. Excavating shipwrecks is and will always be part of maritime archaeology, but maritime archaeologists should target more than shipwrecks only. This section intends to clarify the origin, development and purpose of maritime archaeology as a research discipline.

Until the 19th century, interest in shipwrecks and their content was largely driven by curiosity and for economic/salvage reasons. In the first half of the 20th century, technological innovations enabled archaeologists to systematically examine shipwrecks under water (Tuddenham 2010: 6). An article of George Bass (1966) was the starting point for a new archaeological approach. Bass claimed that wrecks should be studied in their entirety and within their broader context, not just from a materialistic point of view, regardless of the complexity/simplicity of the sites or activities (Bass 1966: 15-22; Gibbins & Adams 2001: 284). These ideas were the starting point for a new and more integral archaeological discipline, based on a new contextual methodology (Kuhn 1970: 10; Meide 2013: 7). By that time, there was still a lack of any coherent body of theory and practice, caused by the paucity of theoretically based underwater archaeologists and scholars conversant with archaeological methodology. As a result, the work conducted was defined as a primitive form of underwater archaeology where many practitioners came from other disciplines (e.g. historians, engineers and geologists) (Gibbins 1990: 383; Meide 2013: 7). The 1960s proved to be a very successful period for the development of a new discipline due to the underwater excavations of (nowadays) famous wrecks like the Cape Gelidonya, Yassi Ada, Batavia, the Bremen Cog and the Vasa (see e.g.: Bass et al. 1961; Bass & Van Doornick 1982; Lahn 1992; Cruumlin-Pedersen 2000; Hocker 2011; Van Duivenvoorde 2015). These excavations, in combination with the ‘method centered’ approach that was developed at the excavation of the Mary Rose, would eventually lead to maritime archaeology becoming an academic discipline (Adams 2002: 6).

Soon a revolution was caused by archaeologist Keith Muckelroy. Instead of applying the traditional cultural-historical approach, Muckelroy was influenced by ‘New Archaeology’. His book, Maritime Archaeology (1978), is considered as the most important single statement of maritime archaeological method and theory (Gibbins & Adams 2001: 284). He showed the academic world that the definition of maritime archaeology is a holistic one: “the scientific study of the material remains of man and his activity on the sea” (Muckelroy 1978: 4, 160-165; Tuddenham 2010: 7). Other terms like underwater archaeology, marine archaeology and nautical archaeology were replaced by this broader concept. Despite the great work done by Muckelroy, focus laid too much on ships and shipboard communities, therefore excluding the terrestrial and inland (e.g. shores, lakes and rivers).

The solution to that problem turned out to be the concept of the ‘maritime cultural landscape’, formulated by maritime archaeologist Christer Westerdahl: “the whole network of sailing routes, with ports, havens and harbours along the coast, and its related constructions and other remains of human activity, underwater as well as terrestrial.” (Westerdahl 1992: 6). This concept embeds both maritime and terrestrial counterparts and moved towards a holistic and interdisciplinary approach, no longer solely focusing on shipwrecks and the seabed.

The development of maritime archaeology exposes the difficulty of definitions that are related to it as a research discipline. Does maritime archaeology imply a wider definition than for instance nautical archaeology? As Bass states in his introductory article in the Oxford Handbook on Maritime Archaeology: “in a sense, maritime archaeology is so new it is still defining itself” (Bass 2013: 4). Maritime archaeology, according to the still appropriate definition of Muckelroy, is “the archaeological study of humans and their interactions with the sea and can include sites that are not underwater but that are related to maritime activities such as lighthouses, port constructions or shore-based whaling stations” (Muckelroy 1978: 4; Delgado & Staniforth 2009: 228). It is considered to be the main discipline, as defined by Muckelroy, in which this study is conducted. Nautical archaeology, marine archaeology and underwater archaeology are nowadays considered all to be sub-disciplines of maritime archaeology, but they tend to overlap. This overlap is framed by Muckelroy as he mentions for example that nautical archaeology is a specialty within maritime archaeology (Muckelroy 1978: 4). Furthermore, he and Bass agree that underwater archaeology is not so much a discipline or sub-discipline, but rather a way of archaeology in practice, with different methodological approaches (Bass 1966:...
This study intends not to further question the contextual realms and definitions of these sub-disciplines, as it already has been done by others elsewhere. This study primarily addresses the maritime cultural landscape in the sense of Westerdahl (1992), and therefore is independent of other definitions (see e.g. Delgado & Staniforth 2009: 228).

The international development of maritime archaeology differs from the Dutch development. In the Netherlands, many wrecks were accidentally discovered and studied in the 19th and 20th century from a purely antiquarian interest (Maarleveld 1998: 41). This lasted until the large reclamations of the former seabed of the Zuyder Zee (AD 1927-1968). The wholesale discovery of a vast amount of ship remains led to dozens of archaeological excavations (Van der Heide 1965a). The emphasis at the time was on quick reconnaissance and routine removal of shipwrecks. At first, scientific explanatory questions were limited, but the integration of geological data for examining the proto-historic development of the Flevoland polders could be considered a first step into multidisciplinary research (Maarleveld 1998: 46).

In the years after the reclamation of the Zuyder Zee polders, maritime research still lacked integrated research questions and the salvage of wrecks and a fascination for objects remained until the late 1970s (Maarleveld 1998: 44).

Growing appreciation of maritime archaeological research was stimulated eventually in a more integrative methodology and involvement of academic and engineering institutions in the Netherlands (see e.g. Reinders 1981; Van Holk 1991; Van Holk 1996). Nevertheless, the majority of Dutch maritime archaeological studies has been focused on shipwrecks only, being monographic and object-orientated, resulting in isolated and often technical publications on individual wrecks. Less has been done with other archaeological and contextual aspects of Dutch maritime culture (e.g. harbours, marine erosion, usage of the sea, drowned settlements, coastal life). The remains of ships could for example also be considered materials that can be used to study the societies that invented, built and exploited them (Flatman 2003). Nevertheless, as Van Holk (1991) justly states: wooden ships should be considered as the most complicated man-made structures before the invention of the steam engine and therefore deserve special attention within the research discipline of maritime archaeology. Landscape archaeology of the coastal plains surrounding the Zuyder Zee waters in the Netherlands has had a parallel development (see Chapter 3), and one way to step up the game of maritime archaeology could be to seek connection and integration with shoreline-oriented landscape archaeology (this thesis).

So far, The Zuyder Zee, rightfully considered the maritime heart of the Netherlands, has not often been studied from the concept of the maritime cultural landscape (e.g. Van Holk 2017a), leaving the history of the region partially unclear until present day. The region exhibits a plethora of maritime sites and relics aside from shipwrecks (see Materials). Thousands of archaeological objects related to drowned settlements, many historical maps and charters, spatial data and toponyms testify of a lost medieval maritime culture of the Zuyder Zee region, and could be used to further elucidate the complexity of maritime culture and socioeconomic use of this area.

**Problem definition and research question**

Despite the strong maritime character of the Netherlands, now and in the past, maritime archaeology is considered an understudied research specialism because the nature of archaeological studies is frequently too narrowly focused on terrestrial archaeology whereas the potential importance of maritime archaeology in part remains unrecognized. Archaeological studies that do target the maritime past are particularly focused on shipwrecks. There is no doubt that shipwrecks, of which many have been surveyed, are of great importance as archaeological sources, but they are too often documented as isolated objects, without considering historical, political, social and geographical context. Instead, these wrecks should be considered as part of the maritime landscape. However, in order to understand the latter, there is an urgent need for new interdisciplinary approaches in modern day maritime research. Much more should be done with the large amounts of data; maritime archaeological contexts should be assessed and synthesized and linked to output from terrestrial archaeology and other related research disciplines such as the various earth sciences, (landscape and socio-economic) history and historical geography. This would improve maritime archaeological explanation and theory and opens up ways to reconnect terrestrial and maritime archaeology.

The current study focuses on northeastern part one of the most important Dutch maritime landscapes with its rich interdisciplinary datasets: the Zuyder Zee. The late medieval formation of the Zuyder Zee as a result of human landscape interference (land reclamation and cultivation), and the consequences for the inhabitants of the Zuyder Zee region, forms an underrepresented research theme. Previous palaeogeographical and archaeological studies (both national and regional) have to a large extent neglected the dynamic development of the region before the floodings, assuming that marine erosion has destroyed all relevant evidence of that previous...
Figure 1.2. Topographical map of the main research area (inside red lines) and surroundings in the center of the Netherlands.
period. The aim of this study is to prove the opposite, by investigating the largely unknown maritime landscape of the northeastern part of the Zuyder Zee in the period of c. AD 1100–1400. It examines the interrelation between landscape development, human exploitation of land (reclamation, cultivation, habitation) and water (fishing, transport), including the reconstruction of its historical background (political and socio-economic actions), in other words: the reconstruction of the late medieval maritime (cultural) landscape of the northeastern Zuyder Zee. Essentially, it is a methodology-based study, as it intends to develop an interdisciplinary method to reconstruct eroded medieval landscapes before the times of their decay. A method not only applicable to the Zuyder Zee region, but also to other regions and/or countries. Furthermore, changing the focus from and beyond shipwreck-orientated maritime archaeological studies to more integrative studies on the dynamics of the maritime landscape forms a primary target of the present study.

The central research question underlies this: “How can interdisciplinary and methodological research, using different research approaches, contribute to improved understanding of developments shaping and altering the landscape and human usage of the northeastern Zuyder Zee between 1100 and 1400 AD?” Five interrelated papers are designed to answer the central question, together making up the core of this study (see: Methodology).

Research area and research period

This study focuses on the northeastern part of the Zuyder Zee (Zuiderzee; Southern Sea) and its shores, a region which in the modern geography covers the Noordoostpolder and its surroundings (IJsseldelta, Kampen, polder Mastenbroek, Zwarte Meer, Vollenhove and Kuinre). The region is most suitable for an analysis of the maritime cultural landscape of the Zuyder Zee because of (1) its dynamic past (from land into sea into polder), (2) its submerged settlements and former islands, (3) its rich palaeogeographical record as its geology and geomorphology are known in detail (4) its land-based cultural archaeological surroundings that are well-known in a historical and terrestrial-archaeological perspective.

The research covers the Dutch Late Middle Ages and focuses on the period of AD 1100–1400, as that period embeds the processes of high medieval land reclamation and progressive late medieval peat erosion and the simultaneous Zuyder Zee formation. Furthermore, archaeological material (i.e. pottery sherds) that has been found in the Noordoostpolder and the neighbouring maritime areas, representing the first phase of habitation, corresponds to this period.

A complete overview of the late medieval landscape development and habitation can be found in Chapters 2 and 6. Here, a brief impression of the dynamic development of the region will be sufficient. During the Roman Era and Early Middle Ages, the region was characterized by vast peatlands and large bodies of fresh water, referred to as Lacus Flevo (Flevo Lake), which was succeeded by the Almaere (Omnipresent lakes; see: Chapter 2). At the dawn of the Late Middle Ages, reclamation, cultivation and heavy storms weakened the peatlands, which resulted in major floods and land erosion. In the 12th century AD, massive floods removed the final peat barrier between the North Sea and Almaere, which caused the formation of the Zuyder Zee. Although the name refers to a mass of water with marine characteristics, the Zuyder Zee should not be considered a separate individual sea but rather a southern extension of the North Sea that functioned as a tidal lagoon. Within three centuries, most of the peatland was taken by the sea, despite the presence of early coastal defenses.

The oldest historical maps of the Zuyder Zee, dating back to the 16th century AD, depict the region after the process of severe marine erosion. These maps provide a first glimpse of the main research area: it consists of a northeastern coastal zone, two former islands (Urk and Schokland) and the IJssel river mouth in the southeast (Fig. 1.2). It measures c. 1,160 km² with maximum cross-overs of c. 39 x 41 km and was relative densely inhabited with small coastal settlements in the northeast (e.g. Lemmer, Kuinre, Blokzijl and Vollenhove), on both islands (Urk, Emmeloord and Ens) and near the river IJssel (e.g. Kampen, Ijsselmuiden and Graafhorst; Fig. 1.2). These historical maps depict the final product of marine development (landscape change was relatively limited in the following centuries), but the current study focuses on the path towards the formation of the Zuyder Zee, of which no palaeogeographical and historical maps exist.

Another 400 years would go by before it was decided to dam and reclaim the Zuyder Zee. In 1932, the construction of a 32 km long dam was finished that closed the Zuyder Zee from the North Sea. By 1942, the northeastern part of the former lagoon was reclaimed and cultivated (Noordoostpolder). Far stretching arable fields, large farms, modern settlements and a great number of windmills set the present scene of the region and are quite the opposite of the late medieval appearance of the region. The former islands Urk and Schokland are now embedded in the modern polder landscape whereas coastal towns like Kuinre, Blankenham and Blokzijl along the former northeastern shore of the Zuyder Zee transformed into inland settlements and lost their maritime functions.
Materials
Each of the research components deals with different datasets (materials). These datasets form a layer (e.g., soil maps, coring data, geological studies form the geological data layer), whereas the combination of layers leads to an understanding of the late medieval research area, as is illustrated in Figure 1.3. Data were assembled in a variety of formats, such as databases, spatial layers, books, field observations, articles, reports, photographs, maps, objects, notes and archival records. In some cases information of different layers corresponds, like for instance historical dike remains that could be visible on aerial photographs, LIDAR-data and geological maps. This overlap strengthens the methodology of the research as well as the reliability of the content of the datasets.

Chapters 2, 4 and 5 have a strong spatial character as they focus on the geological record and material remains that were left behind by the historical inhabitants and/or users of the Noordoostpolder region (i.e., shipwrecks, settlement remains, dikes, ditches). Therefore, the formats of many datasets were transformed into spatial layers and collated into a single project GIS. A short overview is provided below of the most important layers that were used for this study.

Geological and palaeogeographical maps
The subsoil of the Noordoostpolder region has been carefully studied in the past, even before the 20th century reclamations. Documentation of hundreds of soil profile pits and thousands of shallow corings resulted in accurate soil maps that appeared in the period of 1947–1956 (Bodemkundige Code- en Profielenkaarten). The doctoral thesis of Wiggers (1955), partially based on these maps, provided the first relevant geological maps of the research area. Although these datasets are over 60 years old, they are still considered as reliable, accurate and of importance for current research. Ever since Wiggers published his maps, they have been adopted (visible or less visible) in many palaeogeographical and geological studies. The maps of for example Zagwijn (1986), Gotjé (1993), Ten Anscher (2012) and Vos & De Vries (2013) all relate (partially) back to the interpretations of Wiggers (see Chapter 2).

Historical maps
Further important data comes from historical maps: Walsmit et al. (2009) created a clear overview of the available and known historical maps of the Zuyder Zee region. Most of the maps date to the 19th and 20th centuries and depict the Zuyder Zee in its final shape (the end product of marine erosion). The oldest maps in the overview date back to the middle of the 16th century and, although not being very spatially accurate, they contain valuable information on settlements (especially those that eventually drowned) and the layout of the landscape (division land/water, rivers, roads). It is important to keep in mind that they provide an overview of the Noordoostpolder region after the Late Middle Ages (Fig. 1.4). Within the research area the known settlements Vollenhove, Blokzijl, Baarlo, Blankenham, Kuinre, Slikenburg, Emmeloord, Ens and Urk are marked. A more accurate historical map of the Zuyder Zee region was made by Christian Sgroten (c. AD 1570) and also depicts the same settlements as on the map from 1540, including the settlement Fenehuysen, several kilometers to the northwest of Kuinre.

Aerial photographs
Aerial photographs were already analysed for archaeological purposes in the late 19th century, although they were not primarily made for this purpose (Ceraudo 2013: 11; Cowley & Ferguson 2010: 97; Reeves 1936: 102). The techniques used and the quality of the photographs were however very basic in the early days. The quality of the images improved from the moment they were taken from planes. Especially during the Second World War, when Allied forces took hundreds of thousands photographs of Europe, the quality and quantity of the dataset drastically improved.

The first photographs of the Noordoostpolder region were taken during the Second World War by the Royal Air Force (RAF), shortly after the reclamations was finished. They focused on the former islands Urk and Schokland and on the former east shore of the Zuyder Zee. More photographs were taken after the war (1947, 1949) and these series cover the whole Noordoostpolder region. They offer a unique view on the former seabed with very limited urban development yet. New series of aerial photographs were taken in 1960, 1971, 1981 and 1989, but their prospective value is more limited due to increased extent of urban areas, extensive and mechanized agriculture and altered vegetation cover (development of forests). The RAF-photographs of the Noordoostpolder depict the partially cultivated soil of the research area (the western part of the polder was not yet dry enough). Remains of dikes and terps are visible as a network of linear dark lines and circles in the direct surroundings of Schokland and Urk, although not very clear (Fig. 1.4; see also Chapters 2 and 4). The post-war photographs from especially 1949 and 1971 clearly show (1) networks of dike remains and terps, (2) medieval parceling in the northeastern coastal zone and near Urk and (3) the remains of the second castle of Kuinre (see De Boer & Geurts 2002). It is clear that specific soil conditions (e.g., dry and ploughed) can strongly influence the visible archaeological traces, as they are much clearer on some aerial photographs.
**LiDAR data**

Since 1997, LiDAR data has been collected at regional scale in the Netherlands for the construction of a nationwide Digital Elevation Model (DEM). Initially aiming at a resolution of one surface elevation point per 16 m² (Lemmens 2011: 153). The first LiDAR DEM, called AHN1 (Actual Height database for the Netherlands) was finalized in 2003 and had a maximum resolution (depending on the region) of 1 surface elevation point per 1 m² (Van der Zon 2013: 6). This would prove to be insufficient for finding archaeological traces and sites in the Noordoostpolder region. As needs were created, the building of the AHN2 started in 2006 and the new nationwide coverage by LiDAR-data was finished in 2012. This new DEM had a resolution of 6-10 points per m², with the possibility to create a grid with cell sizes down to 0.5 m x 0.5 m (compared to the 100 m, 25 m and 5 m grids of the AHN1 data products). Detailed analyses of AHN2 data in a GIS have proven to be of high value in finding archaeological sites in the research area. Especially in those areas where aerial photography is of no use: the forests. Laser pulses that are shot from an aircraft towards the earth's surface result in several returns: the first return will be received from the first obstacle that is hit (this would be the top of a tree in a forest), while the last return in theory would come from the surface of the forest floor (Lim et al. 2003: 93). By separating the results from different returns, it is possible to make a DEM of the ground surface of a forest.

With the relative high resolution of the AHN2 and the possibility to make a DEM of the ground surface of forests, some interesting results can be gained from the Noordoostpolder region. The best example of the added value of LiDAR-data comes from the Kuinre Forest. This forest was planted in 1947-1953, which means that only aerial photographs until 1949 can be consulted. These photographs depict some vague traces of historical parceling to the northwest of Kuinre. Once a detailed LiDAR DEM of the same region is examined in a GIS, it becomes clear that a whole system of historic parceling is preserved in the forest soil (see Chapter 4). Unfortunately, most of the agricultural grounds in the Noordoostpolder have been ploughed so often that the ground surface is relatively flat and archaeological traces have become invisible on LiDAR-images. Some large natural features, like prehistoric creek systems and river dunes are still visible: this is caused by limited soil compaction of these sandy traces, compared to stronger compaction of the clayish or peaty surrounding soils.

**Late medieval archaeological finds**

Ever since the reclamation of the Noordoostpolder, thousands of archaeological objects (not being shipwrecks) have been found in the former seabed. Some of these finds are of prehistoric age (see e.g. Raemaekers 2010), but a substantial number of objects belongs to the Late Middle Ages. Many of these finds were found *ex situ*, for example during agricultural processes like ploughing. Until recently, no overview existed of these finds and an overall interpretation of the lost contexts lacked. The presence of medieval archaeological remains is in some cases interpreted as part of the inventory of wrecked ships, while others simply consider these materials as noise. Wiggers (1955) and Van der Heide (1965a) were the first scholars that interpreted the assemblage of archaeological materials as the remains of medieval settlements. Although their interpretations were put on paper, they were never thoroughly updated or expanded.

In order to find out whether the medieval archaeological material actually represents lost settlements, a reliable dataset had to be created. Therefore, information on relevant archaeological finds was assembled from all kinds of sources: the Dutch national archaeological database (ARCHIS), documentation of amateur archaeologists, archaeological reports, daily reports and distribution maps. Besides primary information on type, amount and age of the material, spatial information (coordinates) was provided. The whole set of information was transported to the new Medieval Settlement Database (MSD). Spatial analyses on the archaeological objects of the MSD have shown distinct patterns in the distribution and density of material. Only those locations that contain a significantly larger amount of material than the average spread of objects in the region are expected to represent settlement remains (Van Popta 2016: 86). There are several locations in the Noordoostpolder that meet the requirement above mentioned. Besides the spread of objects, the composition of the archaeological material is of importance for recognizing settlement remains. Medieval pottery sherds are the most commonly found artefacts in the research area, but the assemblage of settlement remains should consist of more than only sherds (see Chapter 4).

**Shipwrecks**

Wrecks can be used to date specific maritime contexts and provide important information on specific periods (Westerdahl 1992: 7). In most cases, wrecks will be discovered underwater, but the present maritime archaeological situation in the province of Flevoland is quite the opposite: most wrecks have been found in the reclaimed soil of the former Zuyder Zee. Therefore, their presence in combination with their date of wreckage also provides information on the division of land-water and the age of specific (marine) soil layers (see Van Popta 2013). As information about the Zuyder Zee wrecks has been spread over several (outdated and/or inaccurate)
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databases and archives, it was decided to build a new database first: Shipwreck Database Flevoland (SDF: Van Popta 2012a; 2017). The number of relevant shipwrecks for this research, namely those that wrecked in the Late Middle Ages, is however limited to 10. Their contribution to this research is therefore somewhat limited (see Chapter 5 and 6).

Human behavior
The above mentioned datasets depict to a large extent the maritime landscape with the leftovers its inhabitants (submerged settlements, shipwrecks, traces of land cultivation), but without human actors. Individual actions and thoughts of late medieval inhabitants of the study region are hard to recreate, but it is possible to

Figure 1.3. Overview of the interdisciplinary research methodology of the current study. Information from the different layers is transported to the top layer (reconstruction).
focus on their way of life (socio-economic, political), and the development and history of the settlements that they lived in from an archaeohistorical point-of-view. Therefore, historical studies have been used that target late medieval human behavior in the Low Countries (e.g. Geurts 2005; Weststrate 2008; Brand & Knol 2010; Van Bavel 2010; Mol 2011; Jager 2015). Combining their results with information from the before mentioned materials provides an overview of late medieval life in the northeastern Zuyder Zee region (see Chapter 6).

**Methodology**

Marine erosion and human landscape interference (reclamations, ploughing, construction) have drastically reduced the quantity and quality of relevant archaeological and geological sources, which makes a single-disciplinary study on the current topic unfeasible. Therefore, it was decided to use an interdisciplinary and spatial approach that integrates historical, geographical, geological and archaeological data sources from the Zuyder Zee region, and resulted in five interrelated research components, each one representing a single chapter (Fig. 1.1).

Due to the interdisciplinary nature of the current study, it is important to clarify the position of the research with regard to the research disciplines involved. As the research has been carried out by an archaeologist, the results, interpretations and conclusions are in the first place written from an archaeological point of view. It would be wrong to claim that incorporating and analyzing geological or historical data creates geological or historical studies. However, the datasets, results, interpretations and conclusions that are (partially) based on disciplines other than archaeology have been examined, discussed and reviewed by experts from those disciplines. Nevertheless, archaeology is in most chapters considered the most important discipline as can be seen in table 1.1.

As a result the research has a strong methodological character that suits its interdisciplinary nature. In general, three methodological approaches are used in order to tackle the research problems and to answer the research questions mentioned earlier. A palaeogeographical approach is used for analyzing the (eroded) late medieval physical landscape of the research area (Chapter 2). A maritime archaeological approach is undertaken for studying the material maritime culture from a theoretical (Chapter 3) and spatial (Chapter 5) point of view. Last but not least, a historical-geographical approach is used to understand the material and historical maritime remnants (Chapters 4 and 6). On paper, these methodological approaches might look like separate pillars, but their results are simultaneously used in other parts of the thesis as well. Chapter 2 describes for example the palaeogeographical approach for reconstructing the physical landscape of the research area, but important archaeological and historical datasets (part of Chapters 4 and 6) are used for the analysis. Therefore, it is best to state that the three methodological approaches use a layered model of datasets that are used in an interchangeable way.

Chapter 2 presents a physical reconstruction of the highly dynamic maritime landscape development of the Noordoostpolder region between AD 900 and AD 1600. Until recently, no late medieval palaeogeographical maps existed of the Zuyder Zee region due to the lack of relevant geological data, hence the particular appearance of the medieval landscape remained unad-

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**Table 1.1. Overview of the research approach(es) of the current study.**

<table>
<thead>
<tr>
<th>Part</th>
<th>Disciplines involved</th>
<th>Approach</th>
<th>Nature</th>
<th>Main product</th>
<th>Main content in</th>
</tr>
</thead>
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<tr>
<td>Ch. 2</td>
<td>Archaeology, geology, landscape history</td>
<td>Palaeogeographical</td>
<td>Spatial</td>
<td>Map series of the research area between AD 1100 -1400</td>
<td>J. of Landscape History</td>
</tr>
<tr>
<td>Ch. 3</td>
<td>Archaeology</td>
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<td>Implementation of the MCL concept as a theoretical framework for this study</td>
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<tr>
<td>Ch. 4</td>
<td>Archaeology, historical geography</td>
<td>Historical-geographical</td>
<td>Archaeological (material)</td>
<td>Case study on the study of archaeological remains from the area of research</td>
<td>European J. of Archaeology</td>
</tr>
<tr>
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<td>Maritime archaeological</td>
<td>Spatial</td>
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<td>Paletterria</td>
</tr>
<tr>
<td>Ch. 6</td>
<td>Archaeology, history, historical geography</td>
<td>Historical geographical</td>
<td>Historical (immaterial)</td>
<td>Identity of maritime inhabitants of the research area</td>
<td>Int. J. of Maritime Archaeology</td>
</tr>
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</table>
dressed. It was decided to flip the order of disciplines for a palaeogeographical reconstruction: archaeological evidence was used to reconstruct former land surface areas whereas geological, historical and spatial datasets were used to complement the reconstructions. This layered approach resulted in a new time series of four reconstruction maps (AD 900, 1100, 1400 and 1600) that clarify physical landscape changes and, in contrast with true palaeogeographical maps, highlight traces of habitation and reclamation.

Chapter 3 examines theory and practice of the maritime cultural landscape in general and explores ways to project the concept on the region of study. It provides necessary theoretical background for Dutch maritime archaeology in general and functions as the theoretical framework of the current study (Table 1.1). Whereas Chapter 2 provides a general overview of late medieval habitation in the Noordoostpolder region, Chapter 4 focuses explicitly on these locations. It examines the spatial distribution and density of physical evidence (archaeological objects) and studies historical and remote sensing datasets in order to localize and characterize late medieval habitation in the research area. This layered approach, as a continuation of the approach of Chapter 3, resulted in the discovery of remains of the drowned settlement Fenehuysen. Chapter 5 focuses on the approximately 450 shipwrecks that were discovered in the reclaimed part of the Zuyder Zee (Province of Flevoland). Primary information of these shipwrecks was assembled from relevant datasets and stored in the

Figure 1.4. Historical map of the Zuyder Zee region for c. AD 1535 (Historisch Centrum Overijssel, map KD 00372).
General introduction

Shipwreck Database Flevoland (SDF). Part of the content of the SDF turned out to be inaccurate (especially concerning the location of wreck sites) and outdated. To improve the quality of data and accuracy of wreck site locations, several remote sensing techniques were successfully used. The SDF holds only 10 shipwrecks that date between AD 1100 and 1400 and wrecked in the Noordoostpolder. The locations of these late medieval wrecks are relevant for the study as they prove the presence of water, but provide a limited contribution to this research due to their small numbers. Their function (all being freighters) is relevant for the use of water in the Late Middle Ages and is therefore treated as a section of Chapter 6. The results of this chapter therefore provide not only a more reliable dataset for further maritime archaeological research, but also demonstrate to critically evaluate datasets before interpreting and including them. Chapter 6 examines the nature of habitation and way of life of the late medieval inhabitants. This part of the study is mainly based on historical and archaeological studies and examines ‘who’ the inhabitants of the research area were and ‘how’ they managed to live in such a dynamic environment. Four distinct settlements from the research area (Kuinre, Kampen, Urk and Nagele) and their inhabitants are studied in detail (development, economic focus). Whereas Chapters 2, 4 and 5 target the physical landscape and mainly material remains of late medieval habitation, Chapter 6 complements them by focusing on the actions of the inhabitants. Together, the six chapters provide a multiple understanding of the late medieval maritime (cultural) landscape of the northeastern Zuyder Zee region.

Outline of the thesis

The study consists of five interrelated research components (each one represents a peer-reviewed article) designed to answer the main research question (see also Methodology). Chapter 2 examines the late medieval palaeogeographical development of the study region based on an ‘archaeology-first–geology-second’ approach and presents a palaeogeographical reconstruction map series for AD 900, 1100, 1400 and 1600. Chapter 3 investigates theory and practice of the Maritime Cultural Landscape in general and examines how theoretical concepts and aspects of the MCL can be projected on the northeastern Zuyder Zee region. Chapter 4 focuses on the spatial distribution of late medieval archaeological objects in the Noordoostpolder and projects them on the maps that were constructed in Chapter 2 in order to interpret and characterize the materials. Chapter 5 consists of an in-depth study of shipwreck data of the entire Zuyder Zee region. The locations of many wreck sites in the province of Flevoland turned out to be highly inaccurate. Therefore, this part of the study delivers not so much a contribution with respect to the interpretation of the late medieval maritime cultural landscape, but demonstrates that, despite the strong maritime archaeological focus on shipwrecks, primary data is still not fully trustworthy. Chapter 6 is an archaeohistorical overview of late medieval life in the research area and focuses explicitly on the inhabitants of the research area and their actions. Chapter 7 contains the discussion and synthesis, answers the central research question and uses four themes to reflect upon the entire study.

Endnotes

1 A more detailed and extended overview on maritime archaeology as a discipline is provided in Chapter 3.
2 The content of this database is subject to change and therefore only made available online (www.easy.dans.knaw.nl).